

08/485,219, filed on June 7, 1995 (Attorney Docket 16238-000600), the complete disclosures of which are incorporated herein by reference for all purposes. ~~This application~~ U.S. Patent Application No. 09/767,194 is also a continuation-in-part of U.S. Patent Application No. 09/026,851, filed February 20, 1999 (Attorney Docket No. S-2), which is a continuation-in-part of U.S. Patent Application No. 08/690,159, filed July 18, 1996 (Attorney Docket No. 16238-001610), the complete disclosure of which is incorporated herein by reference for all purposes.

IN THE CLAIMS:

Please delete claims 33-57, amend claims 1, 5, 7, 11, 20 and insert new claims 58 and 59.

Claim 1 (amended): A method of treating an inter-vertebral disc, comprising:

a) contacting at least a first region of a nucleus pulposus of the inter-vertebral disc with at least one active electrode of an electrosurgical system, the at least one active electrode disposed on a shaft of an electrosurgical probe, ~~and the at least one active electrode functionally coupled to a power supply unit; and~~

b) applying a first high frequency voltage between the at least one active electrode and at least one return electrode, wherein at least a portion of the nucleus pulposus is effected ~~ablated and the volume of the nucleus pulposus is decreased.~~

Claim 2 (as filed): The method of claim 1, further comprising:

c) contacting at least a second region of the nucleus pulposus of the inter-vertebral disc with the at least one active electrode, and thereafter, repeating said step b).

Claim 3 (as filed): The method of claim 1, wherein during said step b), the at least one active electrode is translated within the nucleus pulposus, wherein a channel is formed within the nucleus pulposus, and translation of the at least one active electrode within the nucleus pulposus is implemented via movement of the probe.

Claim 4 (as filed): The method of claim 3, wherein movement of the probe is selected from the group consisting of axial movement, rotational movement, and concurrent axial and rotational movement.

Claim 5 (amended): The method of claim 1, wherein said steps a) and b) result in formation of a channel within the nucleus pulposus, the channel having a channel wall, and the method further comprises:

d) positioning the at least one active electrode adjacent to the channel wall;
and

e) coagulating tissue of the nucleus pulposus by applying a second high frequency voltage between the at least one active electrode and the at least one return electrode, ~~wherein the second high frequency voltage is adapted for coagulating tissue of the nucleus pulposus.~~

Claim 6 (as filed): The method of claim 5, wherein tissue at the channel wall is coagulated, and the nucleus pulposus undergoes a physical change selected from the group consisting of stiffening, increased rigidity, increased strength, decrease in volume, and decrease in mass.

Claim 7 (amended): The method of claim 5, wherein the first high frequency voltage is in the range of from about 150 to about 700 volts rms, and the second high frequency voltage is in the range of from about 20 to about 150 volts rms.

Claim 8 (as filed): The method of claim 5, wherein the first high frequency voltage is in the range of from about 150 to about 350 volts rms, and the second high frequency voltage is in the range of from about 20 to about 90 volts rms.

Claim 9 (as filed): The method of claim 1, wherein the at least one active electrode and the at least one return electrode are disposed on a distal end of the shaft, and the at least one return electrode is spaced proximally from the at least one active electrode.

Claim 10 (as filed): The method of claim 1, further comprising the step of:

f) prior to said step b), providing an electrically conductive fluid at the at least a first region of the nucleus pulposus.

Claim 11 (amended): The method of claim 10, wherein said step ~~g)~~f) comprises applying the electrically conductive fluid to the at least one active electrode, or applying the electrically conductive fluid to the disc.

Claim 12 (as filed): The method of claim 10, wherein the at least one active electrode and the at least one return electrode are disposed on a distal end of the shaft, and the at least one return electrode is spaced proximally from the at least one active electrode, and the electrically conductive fluid provides an electrically conductive path between the at least one active electrode and the at least one return electrode.

Claim 13 (as filed): The method of claim 1, wherein the shaft includes a shaft distal end, and the shaft distal end is introduced into the nucleus pulposus via an introducer needle, the introducer needle includes a lumen and a needle distal end, the shaft distal end includes at least one curve therein, and the shaft distal end is retractable into the lumen without contacting the needle distal end.

Claim 14 (as filed): The method of claim 1, wherein the shaft is visualized fluoroscopically or endoscopically.

Claim 15 (as filed): The method of claim 1, wherein the at least one active electrode comprises an electrode head having a substantially apical spike and a substantially equatorial cusp, and the shaft includes an insulating collar located proximal to the electrode head.

Claim 16 (as filed): The method of claim 15, wherein the insulating collar comprises a material selected from the group consisting of: a ceramic, a glass, and a silicone.

Claim 17 (as filed): The method of claim 1, wherein the at least one active electrode includes a filament, the shaft includes a first insulating sleeve encasing the filament, a return electrode on the first insulating sleeve, and a second insulating sleeve on the return electrode.

Claim 18 (as filed): The method of claim 1, wherein the shaft includes a shield encasing the shaft, wherein the shield decreases the amount of leakage current passing from the electrosurgical probe.

Claim 19 (as filed): The method of claim 1, wherein the shaft includes a first curve and a second curve proximal to the first curve, the first curve and the second curve are in the same plane relative to the longitudinal axis of the shaft, and the first curve and the second curve are in different directions relative to the longitudinal axis of the shaft, the first curve is characterized by a first angle and the second curve is characterized by a second angle, wherein the first angle is less than the second angle.

Claim 20 (amended): The method of claim 1, wherein ~~decreasing the~~ volume of the nucleus pulposus is decreased and relieves pressure exerted by the nucleus pulposus on an annulus fibrosus.

Claim 21(amended): The method of claim 1, wherein ~~decreasing the~~ volume of the nucleus pulposus is decreased and decompresses at least one nerve or nerve root, and discogenic pain is alleviated.

Claim 22 (as filed): The method of claim 1, wherein during said step b), the at least one active electrode is axially translated within the nucleus pulposus to form a channel within the nucleus pulposus, wherein the channel is formed by a single straight pass of the shaft in the nucleus pulposus, and the channel has a volume in the range of from about 1 mm³ to about 2,500 mm³.

Claim 23 (as filed): The method of claim 22, wherein the channel has a volume in the range of from about 10 mm³ to about 2,500 mm³.

Claim 24 (as filed): The method of claim 22, wherein the channel has a diameter in the range of from about 0.5 mm to about 7.5 mm.

Claim 25 (as filed): The method of claim 22, wherein the channel has a length in the range of from about 2 mm to about 50 mm.

Claim 26 (as filed): The method of claim 1, wherein during said step b), the at least one active electrode is axially translated within the nucleus pulposus and concurrently therewith the shaft is rotated about its longitudinal axis, wherein the at least one active electrode forms a channel within the nucleus pulposus, the channel is formed by a single rotational pass of the shaft, wherein the at least one active electrode is disposed on a distal end of the shaft, the shaft includes at least one curve, and the channel has a volume in the range of from about 2 mm³ to about 38,000 mm³.

Claim 27 (as filed): The method of claim 26, wherein the channel has a volume in the range of from about 50 mm³ to about 10,000 mm³.

Claim 28 (as filed): The method of claim 1, wherein the shaft has a length in the range of from about 4 cm to about 30 cm, and the shaft has a diameter in the range of from about 0.5 mm to about 2.5 mm.

Claim 29 (as filed): The method of claim 1, wherein the shaft includes a shaft distal end, and wherein the shaft distal end is introduced into the nucleus pulposus via an introducer needle, the introducer needle including a lumen, wherein the introducer needle has a length in the range of from about 3 cm to about 25 cm, and the lumen has a diameter in the range of from about 0.5 mm to about 2.5 mm.

Claim 30 (as filed): The method of claim 1, wherein the method is performed percutaneously, and the at least a portion of the nucleus pulposus is ablated at a temperature in the range of from about 45°C to about 90°C.

Claim 31 (as filed): The method of claim 1, wherein the intervertebral disc is a lumbar disc, and the shaft has a length in the range of from about 10 cm to about 25 cm.

Claim 32 (as filed): The method of claim 1, wherein the intervertebral disc is a cervical disc, and the shaft has a length in the range of from about 4 cm to about 15 cm.

Claim 58 (new): The method of claim 1, wherein said portion of the nucleus pulposus is removed.

Claim 59 (new): The method of claim 58, wherein said portion is ablated thereby reducing the volume of the nucleus pulposus.